

Educational Clinical Case Series

Food allergy in children suffering from atopic eczema

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Whilst the association between eczema and food allergy is well established, the role of dietary manipulation in children with eczema remains controversial. These case histories highlight the differing outcomes that dietary manipulation may have in an infant with early onset, severe eczema and an older child with milder eczema. Management strategies and the evidence to support them are presented, followed by a review of clinical recommendations.

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Case 1

A 6-month-old boy presented to the hospital with severe, generalized eczema with weeping, crusted lesions, but no fever. His parents reported exclusive breast-feeding. They had not attempted to introduce solid foods. There had been no improvement despite the daily application of steroid creams, and indeed, he had several exacerbations of eczema during breast-feeding. He was failing to thrive, irritable, and had disrupted sleep. He was born at term, after an unremarkable pregnancy and was of normal weight and length. His mother has asthma and hay-fever. Allergy tests [specific immunoglobulin E (IgE) followed by skin testing] were positive to milk, wheat, egg, kiwi fruit and peanut. An elimination diet was performed by the mother for a period of 4 wk, excluding those foods under suspicion with the assistance of a paediatric dietician. This exclusion led to a clear improvement of the child's eczema.

Discussion

Eczema is a chronic inflammatory skin disease characterized by itching, dry skin and an ongoing course of exacerbations and remissions (1, 2). Eczema is a common disorder in children with a worldwide cumulative prevalence of 15–20% in

this age group (3). Around 50% of cases are diagnosed by the age of 1 yr, with one-third of patients have disease which persists throughout adulthood.

The European revision nomenclature has proposed the term 'eczema' to replace the term atopic eczema/dermatitis syndrome (AEDS) (4). Childhood eczema can be divided into two types, depending on the atopic status (5). AE, also known as extrinsic eczema, is a phenotype of eczema accompanied by IgE sensitization (as demonstrated by IgE antibodies in serum or by positive skin prick test to food or inhalant allergens).

Triggering factors for eczema

Numerous trigger factors for AE have been identified, including allergens, irritant substances and infectious microorganisms such as *Staphylococcus aureus* (Table 1) (6). The role of food allergy is greater in infants than in adults, whose eczema is rarely influenced by dietary factors (2% of them) (7). The prevalence of food allergy in infants with eczema has been estimated at up to 40% (8, 9). Foods may directly provoke flares of eczema which is mostly non-IgE mediated food allergy. A position paper of the EAACI and GA²LEN has been recently published to point out the role of food allergens for eczematous

Table 1. Trigger factors for eczema in children (adapted from Ref. 6)

Food allergens
Inhalant allergens
Contact allergens
Bacterial colonization of the skin
Irritants substances (soap, creams, wool, perspiration, hot bath...)
Cold climate
Psychological factors
Infections

reactions in AE (9). In patients suffering from eczema, the flare-up of eczema after hours or days can be isolated or combined with immediate IgE-mediated symptoms such as urticaria, gastrointestinal, respiratory symptoms or even anaphylaxis.

Food allergy and atopic eczema

On the basis of the literature from the past 10 yr, in which food allergies were proven by the gold standard of double-blind placebo-controlled food challenges, the prevalence of food allergy in infants with eczema was reported to range from 33% to 63% (13–18) (Table 2).

Nevertheless, published studies did not permit comparison, in terms of various definition used for eczema (19) or atopy (with or without allergy testing), or in terms of study design (retrospective, prospective, or case-studies). Birth-cohort studies should be encouraged because they offer the strongest design to explore the temporal sequence between atopy and eczema. Eczema should be stratified by disease severity. In Australia, a birth cohort of 620 infants with a family history of eczema, asthma, hay-fever or immediate food allergy in a parent or sibling was followed until 12 months (20). Skin prick tests were performed at 6 and 12 months for 141 children with atopic dermatitis. The severity of eczema was quantified by days of topical steroid

Table 2. Prevalence of food allergy in children with eczema (food allergy proved by double-blind placebo-controlled food challenge)

Authors	Year	n	Food allergy (%)
Sampson and McCaskill (11)	1985	113	56
Burks et al. (12)	1988	46	33
Sampson (13)	1992	320	63
Eigenmann et al. (14)*	1998	63	37
Burks et al. (15)	1998	165	39
Niggemann et al. (16)	1999	107	51
Eigenmann and Calza (17)*	2000	74	34
Breuer et al. (18)	2004	64	46

*Unselected children with atopic eczema.

use. The relative risk of an infant with eczema having food allergy increased with severity of eczema and was 5.9 for the most severely affected group (20).

How to diagnose food allergy in atopic eczema?

There is no recommended diet for patients with AE. Dietary restrictions should only be recommended in cases of an established diagnosis of food allergy. Allergy tests should be performed in children with moderate to severe eczema in addition to conventional treatment strategies (21). Other clinical signs associated with eczema should direct the physician towards the possibility of a food allergy and thus the necessity of allergy testing. Indeed, the infant with eczema and food allergy frequently presents with gastrointestinal symptoms (vomiting, persistent diarrhoea), irritability or sleep disorders.

There is no single parameter which can prove the clinical relevance of a sensitizing food in patients with AE. A stepwise procedure addressing individual factors is recommended. Basic investigation for suspected food allergies in infants with eczema include screening tests for IgE sensitization by skin prick test and measurement of specific serum IgE concentrations to common food allergens (Fig. 1) (22). Testing should include allergens suspected by history,

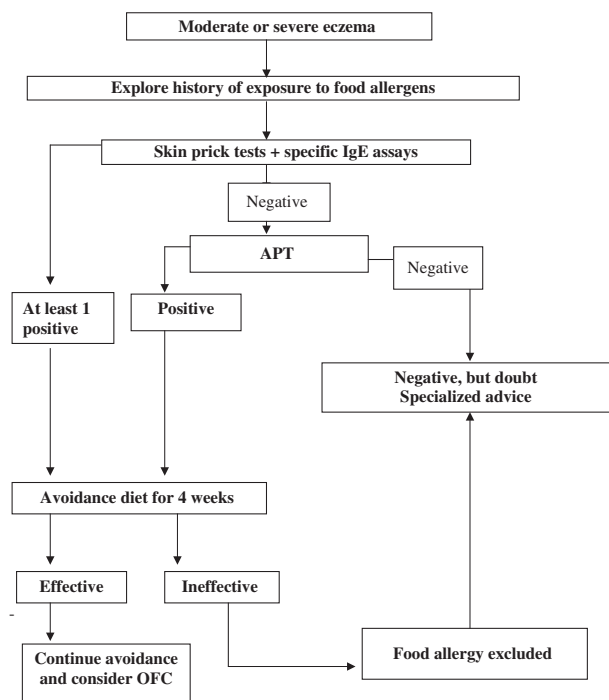


Fig. 1. Food allergy diagnosis in children with eczema. APT, atopy patch test; OFC, oral food challenge.

Table 3. Foods account for more than 90% of the food allergies, according to age

Infant	Children (2–10 yr)	Older children
Cow milk	Cow milk	Peanut
Eggs	Eggs	Tree-nuts
Wheat	Peanut	Fish
Soy	Tree-nuts	Shellfish
	Fish	Sesame
	Shellfish	Pollen-associated foods
	Sesame	
	Kiwi fruit	

and known to elicit reactions most commonly according to the age (Table 3). In our case, known food allergens consumed by the mother should be tested and maternal elimination diet considered. In the case of negative screening tests (which may still occur in 10% of infants with eczema who do have food allergies), the atopy patch test performed by an experienced test evaluator could enhance the diagnostic accuracy (23, 24). Positive results lead to a diagnostic elimination diet lasting 4–6 wk (maternal elimination diet for the breastfed infant). If eczema improves during the elimination diet, the clinical relevance of the eliminated foods should be confirmed by standardized, physician-supervised oral food challenges at a later date in the infant (9, 25).

Accurate diagnosis of food allergy and carefully managed dietary manipulation can improve the symptoms of eczema. Also, infants with early development of IgE sensitization have an increased risk for later development of allergic diseases such as asthma (10). Early identification of children with food allergy and atopic dermatitis may provide opportunities to prevent the progression of the allergic march.

Food allergy during breast-feeding

Historically, there has been widespread support for the concept that breast-feeding is protective against AE and atopic disease in general (26–29). However, in certain cases, breast-feeding could facilitate food allergies by transfer through breast milk from the maternal diet. Exclusive breast-feeding for 4 months should be recommended to prevent atopic disease but there is no evidence to support a protective effect of exclusive breast-feeding beyond this. Mixed feeding should be encouraged until 6 months of age (27). The appearance of atopic signs, such as eczema, should prompt consideration of food allergy.

Australian authors (30) argue that the apparent non-protective effects of breast-feeding demonstrated in some studies could be related to the

fact that the early occurrence of atopic signs in the child encourages the mother to prolong breast-feeding. Lowe et al. followed a cohort of 620 new-born babies (monthly telephone discussion with the mother on the mode of breast-feeding and the occurrence of possible signs of atopy) for 2 yr. They studied the association between the early development of atopic symptoms and the duration of the breast-feeding expressed in 'risk of stop'. They noted an association between early development of atopic symptoms or sensitization and a reduction of approximately 28% of the risk of stop of the exclusive breast-feeding but no correlation with the complete stop of any breast-feeding. In their conclusion, the authors consider that early atopic signs could prolong the duration of the exclusive breast-feeding, even to the extent that breast-feeding itself appears to predispose to the later development of atopic disease – a phenomena known as reverse causality. This is a bias, underlined the authors, that later studies will have to take into account and makes it extremely difficult to evaluate the potential protective effect of exclusive breast-feeding and its duration.

However, breast-feeding should not be continued at all costs. If the infant develops severe eczema whilst it is exclusively breastfed, it is essential to consider a food allergy provoked by proteins in the mother's milk. All food proteins can pass from the maternal diet into breastmilk. If an allergy due to exposure to a protein via maternal milk is diagnosed, it is necessary to modify the diet of the mother, with professional dietetic support and supervision. However, if multiple foods are implicated or there are concerns about maternal nutrition, it may be appropriate to suggest substitution to an appropriate milk formula (30, 31).

Treatment of food allergy in infants with atopic eczema

When a food allergy is diagnosed, the elimination of the offending food allergen should be added to medical management of the eczema. An elimination diet adapted to the allergy diagnosis will frequently improve the severity of the child's eczema. If a maternal exclusion diet is not successful then cessation of breast-feeding, with substitution for an amino acid-based formula may be considered (32), although failure of dietary manipulation may also reflect a lack of relevance of the possible allergen in the causality of the eczema. This latter possibility illustrates the need for allergy diagnosis and dietary manipulation in infant's with eczema to be directed by physicians experienced in the

area, with periods of exclusion followed by reintroduction to clarify the possible role of the food allergen.

Elimination diet represents just one treatment of food allergy. Furthermore, the accompanying pharmacological and non-pharmacological management is also essential. Involvement of a dietician experienced in evaluating the needs of infants is important, as nutritional deficiencies have been reported from such restriction. Advice relating to the reading and interpretation of food labels and the knowledge of the new European directive relating to this will facilitate the choice of the products available to the allergic child.

The purpose of the treatment of eczema is to improve the quality of life of the child and his family and to avoid infectious complications. This comprises three modalities: hydration of the skin, disinfection and anti-inflammatory measures. The appropriate duration of different treatments requires medical supervision. Educational measurements are key (33).

With a coherent and individualised therapeutic strategy, with precise aetiological investigation, the management of infants with eczema should lead to a significant improvement in disease severity as well as improved growth.

Case 2

A 3-yr-old boy presented to the clinic with mild eczema and a highly restricted diet. He had developed severe eczema at 2 months of age, soon after cessation of breastfeeding. The eczema was diffuse and had been resistant to treatment with conventional topical steroid creams. Assessment by an allergist at that point revealed large wheals on skin prick testing to milk and egg. He was put on to an egg and milk free diet (with an amino acid formula) and his eczema improved significantly. By the age of 2, his eczema was relatively mild and he was able to tolerate egg as a cooked ingredient in cakes and biscuits. He was seen by a general physician who suggested Specific IgE testing. Results not only revealed a significant drop in specific IgE to egg but also showed low levels of sensitization to numerous other food allergens including soy, wheat, fish and beef. The parents were advised that although his eczema was mild, exclusion of these other foods would still lead to further improvement. Multiple food exclusions did not lead to any further improvement but during this period his weight dropped from the 50th to the 25th percentile and he developed significant

behavioural issues. He was referred back to the allergy clinic where he was found to have outgrown his egg and milk allergies. His diet was completely liberated, whilst managing residual eczema with topical steroids. He achieved appropriate weight gain and his behavioural problems improved.

Discussion

Whilst the strong association between eczema and immediate food allergy has been well documented (20), the evidence that foods in the infant diet may chronically exacerbate eczema (and improve it when excluded) has been far more difficult to demonstrate. A review by Fiocchi et al. (34) highlighted the difficulties in trying to draw together studies that had looked at the possibility of dietary manipulation improving eczema. It concluded that whilst there was a strong suggestion of evidence of an effect in 15 of the 16 studies considered, no meta-analysis was possible. This was because of variation between studies in design, methods of assessing eczema severity, interventions and outcome measures. The review did highlight that the effect of dietary manipulation appeared to be far more pronounced in children under 2 yr of age with more severe, early onset eczema. There is still a need for large, longitudinal studies where intervention by dietary manipulation is tailored to the individual on the basis of allergy tests and careful clinical history.

A further issue is the importance of using the results of allergy testing in the context of the clinical history. Allergy testing can be helpful in diagnosing immediate food allergy, especially when results are above validated 95% positive predictive values (35), and also act as a guide for possible delayed allergies. However, it may also demonstrate clinically irrelevant sensitization to foods rather than true allergy. There is therefore a danger that tests may be overinterpreted and foods which are in fact irrelevant in the causation of the eczema in that individual are unnecessarily excluded from the diet. As well as causing unnecessary stress due to the difficulty in adhering to an exclusion diet, there is a further risk of nutritional compromise. As the infant with eczema commonly also has other genuine food allergies, they are particularly vulnerable. A careful dietary history coupled with 4–6 wk trials of food exclusion followed by reintroduction can help separate out those foods which are of genuine relevance from those that are not. It is essential that any such dietary manipulation is

Table 4. Checklist to suspect worsening eczema by food allergens and address for testing food allergy

Is the eczema severe?

Consider eczema as severe if there is no improvement using steroids cream or a persistent requirement for them. Other indices can be used to define severity index of eczema (such as SCORAD)

Is eczema being managed appropriately?

Management regimen reported by parents may not always reflect the truth. Consider number of tubes of steroid preparation used monthly and consider the possibility of secondary skin infection

Are there associated signs?

Food allergy is frequently associated with other signs, particularly in infants. Consider food allergy in children with eczema and, gastrointestinal signs, failure to thrive, irritability and sleep disturbance

Is there a family history of atopy?

Atopic family is common in cases of food allergy

Was infant breast-fed?

Eczema related to food allergens often appears in the first 6 months of life, during the period of weaning. However, it may present earlier, during the period of exclusive breast-feeding and careful attention should be paid to the maternal diet

carefully followed up and supervised by a specialist dietician.

Conclusion

Food allergy can be a triggering factor of AE. Foods such as cow's milk and hen's eggs, can provoke flares of eczema. Immediate types of allergic reactions (i.e. non-eczematous reactions) are also observed in patients suffering from AE. Diagnosing food allergy in infancy allows the establishment of a suitable elimination diet (Table 4 presents a checklist). Nevertheless, dietary manipulation is only one aspect of the management of eczema, which must also include other therapeutic strategies.

The first case presented in this article illustrates how real benefit may be achieved in the management of eczema through dietary manipulation, typically in an infant with severe, early onset eczema. In contrast, in our second case, attempts at dietary manipulation in an older child with mild eczema created new problems whilst not improving the eczema.

Within the 'atopic march', eczema is usually the first manifestation of the atopic phenotype. It is therefore important to follow up infants with moderate to severe eczema for development of other atopic disease, such as asthma in mind (10). However, a careful balance is required to ensure that allergy testing is not misinterpreted and only foods that are relevant in the causality of eczema are removed or else there is a risk of unnecessary nutritional compromise.

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